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Note by the Secretary-General

The Secretary-General has the honour to transmit to the members of the General Assembly the report of the Joint Inspection Unit entitled "United Nations system support for science and technology in Asia and the Pacific" (JIU/REP/95/7).

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JIU/REP/95/7

UNITED NATIONS SYSTEM SUPPORT FOR SCIENCE AND TECHNOLOGY IN ASIA AND THE PACIFIC

Prepared by

Homero L. Hernández
Tunsala Kabongo

Joint Inspection Unit

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Acronyms

APCTT	Asia and Pacific Centre for Transfer of Technology
CATC	Civil Aviation Training Centre (Philippines)
DDSMS	Department for Development Support and Management Services
ECDC	Economic Cooperation among Developing Countries
ESCAP	Economic and Social Commission for Asia and the Pacific
FAO	Food and Agriculture Organization of the United Nations
IAEA	International Atomic Energy Agency
IBRD	International Bank for Reconstruction and Development
ICAO	International Civil Aviation Organization
IFAD	International Fund for Agricultural Development
IGCSTD	Intergovernmental Committee for Science and Technology for Development
ILO	International Labour Organisation
IMO	International Maritime Organization
IMR	Institute for Medical Research (Malaysia)
INFOFISH	Assistance in Fish Handling and Processing
INTER-ACT	Technology Development and Training Programme for Computer-based systems (India)
ITU	International Telecommunication Union
JIU	Joint Inspection Unit
NAST	Royal Nepal Academy of Science and Technology
OPS	Office for Project Services
PERUMTEL	Bandung Perumtel Training Centre (Indonesia)
RCA	Regional Co-operative Agreement for Asia and the Pacific Industrial Application of Isotopes and Radiation Technology
RNAM	Regional Network for Agricultural Machinery
SPA	Strengthening the Patent Administration of Malaysia
TCDC	Technical Cooperation among Developing Countries
UNCSTD	United Nations Centre on Science and Technology for Development
UNCTAD	United Nations Conference on Trade and Development
UNCTC	United Nations Centre on Transnational Corporation
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFPA	United Nations Fund for Population Activities
UNFSTD	United Nations Fund for Science and Technology for Development
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organization
UPU	Universal Postal Union
VPA	United Nations Vienna Programme of Action for Science and Technology for Development
WHO	World Health Organization
WIPO	World Intellectual Property Organization

LIST OF EVALUATED PROJECTS

Title	Abbrevation	Ex.Agency & Ref.	Objective
Regional Projects			
1. Asia and Pacific Centre for transfer of Technology	APCCT	ESCAP RAS/86/143	To enable developing member countries of ESCAP to transfer and utilize proven technologies relevant to their respective needs in order to improve their living standards
2. Assistance in fish handling and processing	INFOFISH	FAO RAS/84/027	To facilitate the transfer of appropriate fish handling and processing as well as aquaculture technology and its application among countries in the region
3. Regional UNDP Project for Asia and Pacific on Industrial Application of Isotopes & Radiation Technology	RCA	IAEA RAS/86/073	To increase the use of nuclear technology in regional industries and through this further regional economic development and industrial competitiveness
4. Regional Network for Agricultural Machinery	RNAM	ESCAP	To increase agricultural output and labour productivity as well as improving the working conditions and income of farmers in the participating countries
5. Development of civil aviation training centre	CATC	ICAO RAS/77/041	Establishment and implementation of civil aviation management related advanced/specialized courses for regional particpation
Country Projects			
6. Science and Technology Policy dialogue Nepal (Royal Nepal Academy of Science and Technology) Nepal	NAST	UNCSTD	To develop a portfolio of prioritized initiatives in Science and Technology for development through rounds of policy dialogues among stakeholders of the development process in Nepal
7. Technology Development and Training Programme for Computer-based systems (India)	INTERACT	UNFSTD IND/81/101	To help India develop its software design capabilities and to assist other developing countries in keeping pace with this evolving science
8. Strengthening the Patent Administration Phase II (Malaysia)	SPA	WIPO MAL/87/002	Technological development by promoting national innovative activity and encouraging the transfer of technology through strengthening the patent administration
9. Institute for Medical Research (Malaysia)	IMR	WHO/IDR	To strengthen the research capacity of the institution in the area of tropical diseases
10. Strengthening of Perumtel Bandung Training Resource Centre (Indonesia)	PERUMTEL	ITU INS/83/002	To assist PERUMTEL in developing within the PERUMTEL Education and Training Centre in Bandung a Training Resource Centre

EXECUTIVE SUMMARY AND RECOMMENDATIONS

The Inspectors have evaluated the operational performance and outputs of a sample of ten institution-building projects in science and technology for development supported in Asia and the Pacific region by organizations of the United Nations system. The Inspectors find that with few exceptions the projects were quite successful in achieving their development objectives and that, by these projects, the United Nations system has made a very valuable contribution to fostering endogenous self-reliance in science and technology for the socio-economic and industrial development of countries in Asia and the Pacific.

A major factor of success for most of the projects was strong and consistent support by host governments, which ensured that project management and operations were not unduly constrained by inadequate or untimely delivery of counterpart inputs, or by frequent changes of policy and staff in government and/or national implementing agencies.

Besides a favourable policy and institutional setting, the active participation of various constituents of the production system in project operations, especially in training, and their demonstrated ability to absorb, adapt and build on new technologies, were conducive to the successful transfer to the economic and industrial sectors of the science and technology packages offered by the projects.

The central lesson of this evaluation report is that, despite its essentially catalytic nature, the United Nations system technical cooperation can have a palpable developmental impact and affect the lives of ordinary people where the targeted community is actively involved and the policy and institutional environment is favourable.

The Inspectors believe that these highly positive findings are instructive and timely at this critical juncture where the international multilateral development system is assailed by doubts about its achievements and relevance. Organizations of the System should not recoil from publicizing their success stories.

Notwithstanding wide country and subregional disparities, the Asian experience in the acquisition, development and utilization of science and technology to accelerate socio-economic and industrial development, and the prominent role of trade and investment flows in strengthening regional cooperation and integration, do offer some valuable lessons for other developing regions.

The Inspectors find, however, that organizations of the System, and more particularly the regional commissions, are by and large still to devise more effective inter-regional strategies and/or mechanisms for channelling that experience to countries in Western Asia, Africa and Latin America and the Caribbean along expanded south-south linkages. While the organizations appear to have well developed global information systems which include data on science and

technology, their effectiveness in diffusing technological information to the socio-economic users in the developing countries is far from demonstrated.

In the light of the foregoing, the Inspectors offer the following main recommendations, bearing in mind that their first evaluation report entitled "United Nations System Support for Science and Technology in Africa"(JIU/REP/94/1) contained specific recommendations for improving the System's endeavours in this subject area. Those recommendations, whose relevance and validity have been amply confirmed by evaluation findings in Asia and the Pacific, therefore equally apply to the present report.

RECOMMENDATION 1. Technical Cooperation Achievements

(a) United Nations Development Programme should take the lead in publishing the technical cooperation achievements of the United Nations development system, inter-alia by devoting a separate and prominent chapter on such achievements in the Human Development Report.

(b) All other organizations of the System should similarly endeavour to publish on a regular basis their most significant achievements in development cooperation, using in-house publications and the international media.

RECOMMENDATION 2. Regional Cooperation in Asia and the Pacific. **The organizations of the System and the ESCAP secretariat, in particular, should take additional measures for strengthening regional cooperation in science and technology, especially for the benefit of the Pacific Islands and Least Developed Countries as well as for countries in transition. Such measures could include, inter-alia, training programmes tailored to the special needs of these countries and funded by the more advanced ESCAP Member States.**

RECOMMENDATION 3. Science and technology information systems

(a) Organizations of the System concerned with science and technology should periodically evaluate and report to the Commission on Science and Technology the level of public awareness of their information services in the different regions, as well as actions taken to make their information systems more accessible to potential users in the developing regions.

(b) The Organizations' science and technology information systems should be linked up with

(i) the global information referral system of the UNDP Special Unit for TCDC (UNDP-INRES) in order to expand their accessibility for TCDC purposes; and

(ii) the data banks of the regional economic commissions in order to broaden north-south technological information flows.

RECOMMENDATION 4. Significant strengthening of inter-regional collaboration in science and technology.

(a) All organizations of the System concerned with science and technology should, within their respective sectors of competence, make more systematic use of the science and technology experience, institutions, projects and other appropriate facilities in Asia and the Pacific region as entry points for expanded cooperation with countries, organizations and enterprises in other developing regions, using various approaches such as networking, twinning, or TCDC/ECDC.

(b) Each organization should include a specific provision for inter-regional cooperation in its technical cooperation budget in keeping with the above recommendation.

(c) The Executive Secretaries of the regional commissions should:

(i) Institute annual inter-secretariat meetings focused on inter-regional cooperation in science and technology in particular and social and economic development in general, and a special provision should be made for inter-regional cooperation in the work programmes and budgets of the commissions;

(ii) establish an inter-regional trade and investment information system supported as a joint project by the regional commissions and other appropriate organizations like UNCTAD, UNIDO and WIPO and involving the participation of chambers of commerce and industry in the different regions;

(iii) examine the possibility of strengthening cooperation, including the exchange of information and experiences in science and technology, among intergovernmental groupings or organizations in the different regions;

(iv) establish linkages and regular consultations among the different regional science and technology institutions sponsored by the commissions in their respective regions in order to create an inter-regional network of these institutions in support of expanded south-south cooperation;

(v) initiate a joint resource mobilization strategy targeting public and private sectors in support of the inter-regional network of science and technology institutions or specific projects developed by the network.

INTRODUCTION

1. This is the second of a series of reports by the Joint Inspection Unit evaluating the field-level results and impact of some operational activities of the United Nations system in support of science and technology in the developing countries.

2. The first evaluation report entitled "United Nations System Support for Science and Technology in Africa" (JIU/REP/94/1) used as its frame of reference the United Nations Vienna Programme of Action on Science and Technology for Development (VPA), adopted in 1979, as well as the conceptual and policy parameters subsequently developed by the former Intergovernmental Committee on Science and Technology for Development to guide the organizations' efforts in this subject area. The present report is equally set within the policy framework of the VPA whose continuing validity was reaffirmed in 1989 by the United Nations General Assembly in resolution 44/14 A.

3. One of the main goals of the VPA was to strengthen the role of the United Nations system in its support for the developing countries' efforts in building endogenous capacity in science and technology. That goal continues to feature prominently in major intergovernmental directives on this subject, as reflected for example in the International Development Strategy for the Fourth United Nations Development Decade, UNCTAD VIII in Cartagena, the Rio Declaration on Environment and Development, together with the "Agenda 21", as well as in the establishment of the United Nations Commission on Science and Technology as a new subsidiary body of the Economic and Social Council.

4. These developments attest to the growing recognition within the international community of the pervasive role of science and technology in accelerating sustainable development and industrial growth, and in shaping the economic performance of nations and the progress of humanity in general. As stated in the International Development Strategy for the Fourth United Nations Development Decade, "the reactivation of development in the decade of the 1990s on a sustained basis will be linked to the ability of the developing countries to participate in the rapid advances in science and technology that have characterized the global economy in recent years and will continue to do so in the future. Knowledge is today a crucial determinant of economic progress".[1]

5. Increasingly, therefore, socio-economic modernization has become almost synonymous with scientific and technological progress. In this vein, development co-operation within the United Nations system should primarily aim to support science and technology development in order to help narrow the knowledge gap in this area among nations, especially between the developed and the developing countries.

6. In their first evaluation report mentioned above, the Inspectors noted that there was still much scope for improvement in the organizations' collective

response to intergovernmental mandates on this subject. It was observed in particular that each organization had its own working concept and policy for science and technology for development and that the meaning of the expression "building endogenous science and technology capacity" presented for many organizations a substantial difficulty, which not only constrained cross-organization evaluations and comparisons in science and technology, but was also reflected to some extent in the uneven output performance of the 16 sampled projects evaluated in africa.

7. A 1991 report by the Secretary-General on this subject concluded as follows: "The basic problem in coming to a somewhat definitive view on how far and how much the United Nations system as a whole is contributing to the process of building the endogenous capacities of developing countries is the absence of clearly defined, commonly accepted, operational criteria with which scientific and technological activities could be assessed. In their absence, it is not only not possible to make an ex post facto assessment but, perhaps more importantly, to integrate this dimension into the process of formulating future projects. if endogenous capacity-building in science and technology is to become a major factor in programming external assistance and take its place alongside other, more topical themes, this gap needs to be filled."[2]

8. However, while the first evaluation report brought to light the difficult context affecting United Nations system support for endogenous capacity-building in the African region, the very positive findings of the present report broadly reflect the relatively higher level of scientific and technological self-reliance already attained by many countries in Asia and the Pacific region.

9. In the Asian context, technology in varying degrees has become embedded in production and modernization processes, serving in some advanced cases as a powerful lever of rapid economic and industrial growth. Many countries have long-term and clear-sighted science and technology development policies encompassing, among other things, key components, such as materials, machines, manpower, management and markets.

10. Additionally, sustained political commitment and macro-economic policies in the region have favoured private-sector initiatives and attracted significant foreign direct investments, an important medium for technology acquisition, adaptation and innovation. Advanced role models, such as Australia, Japan, Korea, or Taiwan, have also produced ripples of economic and technological development within the region.

11. Notwithstanding the foregoing, technological progress is far from uniform to most countries of the region. Major disparities exist among and within subregional groups of countries, and in some cases even within individual countries, such as, for example, between the rural and modern sectors. Thus the harmonious diffusion of technological progress within the region and individual countries still calls for concerted actions at the regional and international levels.

12. Other areas for action include, for example, the judicious blending of traditional modes of production with new, capital intensive technologies, or the smooth management of the transition from the former to the latter, and the harnessing of science and technology to the expansion of employment, to poverty alleviation programmes, and to optimal management of environmental resources.

13. The Asian experience in the development of science and technology offers some valuable lessons for other developing regions. The Inspectors have therefore dwelt at some length on inter-regional south-south cooperation and the expanded promotional role that devolves to organizations of the System and the regional commissions more particularly, with emphasis on inter-regional science and technology information systems and TCDC/ECDC approaches.

14. The methodology used for this report is broadly similar to the one used for the first evaluation devoted to Africa, as explained in the following chapter. However, it was not considered necessary to include the in-depth review in the first report of the differing concepts and definitions of science and technology within the United Nations system. Also excluded is a detailed narrative evaluation of each of the projects in view of their high success rate. Instead, the performance of each project and of the whole sample is shown in tabular form, followed by a narrative summary of outputs in four areas: interactions, awareness-building, training, and sustainability.

15. The Inspectors record their appreciation to all the organizations and government officials who collaborated in the preparation of this report.

I. CONCEPT AND METHODOLOGY

A. Concept

16. In their first evaluation report entitled "United Nations system support for Science and Technology in Africa" (JIU/REP/94/1), the Inspectors reviewed the various definitions of science and technology for development as applied within the United Nations system. They noted that the organizations of the System generally ignored or did not use the policy framework of the VPA.

17. As a result, much confusion was found to exist among the organizations as to what constitutes science and technology for development and the desirable elements required to promote endogenous capacity in the developing countries. The different conceptual approaches were found to stem partly from the organizations' distinctive constitutional and sectoral mandates, which also defined the focus and substance of their science and technology activities, as illustrated below (see United Nations document A/CN.11/84):

Type of Organization	Examples
(a) Highly specialized	IAEA,ICAO,IMO,ITU, UPU, WIPO
(b) Broadly sectoral	FAO, UNIDO, WHO
(c) Intersectoral	ILO, UNCTAD, UNCTC, UNESCO
(d) Funding	IFAD, IBRD, UNDP, UNFPA, UNICEF
(e) Coordinating	UNCSTD, regional commissions

18. In the view of one organization (UNFSTD), the lack of a common understanding among the organizations in science and technology matters is of little consequence as long as activities with an essential science and technology dimension are properly embedded in their sectors and follow basic principles underlying all technical assistance projects, the three most important of these being capacity-building, institutions-building and sustainability.

19. But even this seemingly practical approach in no way contributes to clearing the existing confusion as to what exactly are the core elements of science and technology which the organizations should ideally seek to nurture in their support for endogenous capacity building in the developing countries.

20. The definitions offered in the first evaluation report on Africa by ESCAP, ILO, UNCTAD, UNCTC, UNIDO and WIPO, for example, were found to be quite comprehensive, including the inter-related engineering, organization, information and management components. The definitions offered by other organizations were

generally restricted to rational and engineering sciences, exclusive of organization and management technologies.

21. Thus the discussion of these varying concepts is certainly not an academic issue since it has implications for inter-agency collaboration as well as for the proper design, planning, implementation and evaluation of science and technology activities supported by individual organizations.

22. However, this lack of a common system-wide approach to science and technology or to endogenous capacity building appeared to have more adverse effects on the projects implemented in Africa than on the Asian sample. In the latter context, the existence of clear and firm policies and awareness of science and technology issues appeared to have considerably simplified the conceptual and operational inputs of the organizations concerned by the ten projects sampled for the present report.

23. In the light of VPA policy elements and also taking into account the eight operational guidelines[3] adopted in 1983 by the IGCSTD for use by United Nations system organizations, the Inspectors developed, for their evaluation reports on this subject, ten institution - building functions (see below) that should characterize a typical project supporting endogenous capacity building in a developing country.

24. Further, in the absence of a common United Nations system concept of science and technology, the Inspectors had to distil from the VPA and IGCSTD guidelines a working definition to guide their investigation and assessment of project outputs. This working definition, which is very close to the concept used by the former UNCTC, as illustrated in the diagram on page 6, views technology as an integrated package of software and hardware, encompassing production, transformation and marketing skills, organization, management and quality control know-how; scientific, technical and management information.

25. In view of this broad working definition of science and technology capacity building, the Inspectors preferred to select for evaluation only institution-building projects because they have a wide spectrum of action and are most suited for capacity building in the integrated manner recommended by the VPA.

UNCTC: Elements of a Typical Technology Transfer Package

TECHNOLOGY			
Process technology	Product technology	Management technology	Quality control
1. Determination of the type of processing to be used 2. Identification of economically and technically efficient machines and tools required 3. Raw materials specification 4. Plan and design layout 5. Identification and organization of blueprints, specification sheets, operating manuals etc. of all sub-systems 6. Cataloguing the documents, checking for text completeness, translating them for local use	1. Product specification 2. Product design 3. Identification of locally produced equipement and materials, and adpating them	1. Personnel management: . skill identification . training . motivation . desing of rewards and penalties 2. Financial management: . monitoring sales . prioritizing capital . spending . managing revenue expenditures . distribution of dividends . generating financial data useful for management decisions 3. Marketing management: . processing information to guide product development and producting planning 4. Training of sales personnel	Ensuring appropriate design and standards of . materials . equipment . end products

B. Methodology

26. At the outset of the study each executing agency was requested to propose two or three of its completed or on-going science and technology institution-building projects in different regions and at different geographical levels, and to provide appropriate documentation on each project proposed. The Inspectors also selected at random a number of similar projects from the 1992 UNDP compendium of approved projects. Over 100 projects were desk-reviewed and screened to construct a sample of 36 projects distributed as follows, by geographical level: 2 global, 19 intercountry, and 15 country projects, and by region: Africa 16, Asia and the Pacific 10, Latin America and Caribbean 10. The 36 projects were implemented by 22 executing agencies of the United Nations system, some agencies implementing two or three projects in different regions. Most of the projects had more than one phase. All but two projects were externally financed mainly by UNDP, besides government counterpart funding.

27. On the basis of the desk review and project sample, the Inspectors prepared a detailed project assessment checklist which was sent to each executing agency to complete for each of its sampled projects. The checklist requested information on concrete project outputs or contributions under the following ten institution-building functions:

(a) Scientific and technological awareness of specific target groups (e.g., policy and decision makers, targeted communities, etc.);

(b) legislations, policies and strategies at any level;

(c) research and Development (including Science and Technology products, innovations, inventions, patents, etc. attributable to the project as well as their practical industrial applications in the socio-economic sectors, the specific contributions to research and development by executing agency, etc.);

(d) training or human resource development (including type and mode of training, science and technology density, categories of trainees, relevance and impact of training within the project's socio-economic context, and man/hours of training provided by regular staff of the executing agency);

(e) equipment or hardware (including assessing, selecting, installing, operating and maintaining of science and technology hardware as well as its demonstrated appropriateness to the level of indigenous skills and socio-cultural context;

(f) scientific and technical literature produced and/or acquired by the project, scope of distribution and accessibility to the end-users;

(g) computerized information system (including type and volume of information stored and disseminated, the number and profession of regular users, and linkages with other relevant information systems at national, regional or global levels);

(h) technical backstopping (technology transfer) by executing agencies (or applying the accumulated scientific and technical experience of the executing agencies as distinct from the inputs of recruited ad hoc project experts) including estimates of the total man/hours devoted to the project by the executing agency's regular technical staff, number and duration of technical missions to project site, technical documentation produced by the regular staff on and for the project, and any linkages still existing between the executing agency and the project after its completion, etc.);

(i) co-operation and interaction (especially with scientific, technological and professional bodies, productive enterprises in the public and private sectors, and other related development programmes and projects supported by United Nations system organizations and other development partners);

(j) overall sustainability of each project (with emphasis on host government(s)' policy and material support, the project's capacity to generate or raise funds and to self-finance its activities, its contribution to reducing institutional costs and to enhancing operational efficiencies in the supported institution, etc.).

28. The checklist was completed for most of the projects, but the degree of completeness and detail varied widely from one executing agency to another. Information supplied in the checklist for each project was supplemented by findings during visits to project activity sites, discussions with project operators, United Nations system field staff, especially those of UNDP country offices, and government officials.

29. Of the 10 projects selected in Asia and the Pacific region, 5 are intercountry (subregional and regional scope), and 5 are country specific. The 5 country projects are distributed as follows: 2 in South-West Asia, (India and Nepal) and 3 in South-East Asia (Malaysia and Indonesia). In addition, most countries of the region were indirectly covered through the 5 subregional and regional projects included in the sample.

30. The report's findings are derived 50 per cent from field investigations and discussions with project operators and end-users, about 30 per cent from information supplied in the checklist by those executing agencies which completed the checklist and some 20 per cent from desk review of project documentation, especially mid-term and terminal project evaluations. Conclusions from the three sources broadly converged quite often, but whenever findings tended to conflict more weight was assigned to field findings in the evaluation of outputs presented in the following chapter.

III. OUTPUT EVALUATION

A. Overall performance

31. The overall performance of the sampled projects as evaluated by the Inspectors is summarized in the table on page 10. Under each of the ten institution-building functions explained in the preceding chapter, each project is assigned ten percentage points for excellent (E) output; 6 points for fully satisfactory (S) performance; and no point (0) for inadequate or non-applicable output. For example, a project rated excellent for 5 functions (50%) and fully satisfactory for 5 others (30%) scores 80%.

32. In rating each project the Inspectors endeavoured to take into account its central objective(s) with special emphasis on its explicit or implicit long-term development goals in the perspective of endogenous capacity building in science and technology. The ratings do not apply exclusively to the time-limited projects or inputs delivered by United Nations system executing agencies, but also, whenever appropriate, to the performance of the institutions or centres supported by the projects. Since the ratings could not be more scientifically derived, they are based on the Inspectors' carefully informed judgement following a thorough field investigation of the successes and constraints of each project.

33. The ten projects achieved an average output score of 70 per cent, which indicates a high success rate. Only 2 projects (NAST and CATC) scored less than 50 per cent, but only CATC was a flat failure, since NAST was essentially an awareness-raising activity implemented with success by the former UNCSTD.

34. The relatively advanced scientific and technological awareness and capabilities noted in many countries of the region, coupled with a dynamic private sector with adequate financial resources for investment in technological innovations, certainly contributed to the significant output of the sample. Yet another factor of success noted by the Inspectors in the course of their field investigations was the very high technical competence of national project personnel which appeared to facilitate the backstopping role of United Nations system executing agencies.

35. Although the ten institution-building functions used for this evaluation were designed to overlap and to reinforce one another, project outputs were particularly significant in four areas (see performance table), namely cooperation and interactions (linkages) with the private sector and other science and technology agencies at the local, national and regional levels; awareness raising and advocacy for science and technology; training or human resource development; and nurturing of sustainability or self-reliance. These areas are reviewed below.

OUTPUT PERFORMANCE

Project Functions	RCA (IAEA)	APCTT (ESCAP)	RNAM (ESCAP)	INFOFISH (FAO)	SPA (WIPO)	INTER-ACT (NE)	IMR (WHO/TDR)	PERUMTEL (ITU)	NAST (GSTD)	CATC (ICAO)	E	S	O	Function Score %
Interactions	E	E	E	E	E	E	S	E	S	S	7	3	-	88
Awareness	E	E	E	E	E	E	S	E	E	O	8	1	1	86
Training	E	S	E	E	E	S	E	S	O	S	5	4	1	74
Sustainability	E	S	S	S	E	E	E	S	S	O	4	5	1	70
R & D	E	S	E	E	E	E	E	O	O	O	6	1	3	66
Legislations, Policies, strategies	E	E	E	E	E	S	O	O	E	O	6	1	3	66
Technical backstopping	E	E	S	S	S	S	E	O	S	O	4	4	2	64
S & T literature	S	E	E	E	E	S	E	O	S	O	4	4	2	64
Equipment	E	E	E	S	O	S	S	E	O	O	5	1	4	56
Information systems	E	E	S	E	S	S	S	O	O	O	3	4	3	54
TOTAL E	9	7	7	7	7	4	5	3	2	-				
TOTAL S	1	3	3	3	2	6	4	4	4	2				
TOTAL O	-	-	-	-	1	-	1	3	4	8				
TOTAL SCORE %	96	88	88	88	82	76	74	54	44	12	70 % average			

E: Excellent
S: Satisfactory
O: Non applicable or inadequate

/...

B. Cooperation and Interaction with the productive sectors and science and technology system.

36. In marked contrast to the Inspectors' evaluation findings in the African region, the majority of projects evaluated in Asia maintained strong linkages to the private sector. Some of the projects had the explicit objective to introduce technological innovations designed to modernize or expand socio-economic activities and industrial production.

37. For example, the Regional Network for Agricultural Machinery (RNAM), supported by ESCAP, aimed to raise agricultural output and labour productivity through increased mechanization, and to improve the working conditions and incomes of farmers in countries participating in the project's network. For this purpose RNAM maintained close working links with close to 300 private and parapublic manufacturers of agricultural equipment within the region. Through such contacts, training workshops and publications, the project promoted the development, testing and marketing of appropriate equipment for mechanized farming by rural small holders.

38. The merit of this project was to seek in various ways to build a technological bridge between rural farming communities and the modern manufacturing sector of its participating countries with the implicit objective of reducing disparities in technological progress within and among countries of the region. The project additionally provides an important lesson in the application of science and technology to alleviate poverty and tedious working conditions in the rural production sector. As a measure of its successful interactions with the regional economic environment, the project is estimated to have induced investments totalling US$ 110 million mostly by private companies manufacturing agricultural equipment. Although the Inspectors could not thoroughly assess the project's impact on farmers' outputs and incomes, internal follow-up evaluations by RNAM itself indicate positive results varying from one country to another.

39. Another example of successful collaboration among various stakeholders in technological innovations is provided by the Regional Project for Asia and the Pacific on Industrial Application of Isotopes and Radiation Technology (RCA), executed by IAEA under an Intergovernmental Regional Cooperative Agreement. This two-phase, ten-year project had the overall objective to increase the use of modern nuclear technology in regional industries in order to improve regional economic development and the competitiveness of manufactured products on world markets.

40. As shown in the output performance table, RCA was in many respects a remarkably successful undertaking involving close interactions amongst several key actors, namely the host governments of the 15 developing and developed countries of the region which formalized their cooperation under an intergovernmental agreement and provided significant counterpart resources; IAEA which executed the project; UNDP which financed a good portion of the project's hard currency costs; about 18 national implementing agencies or centres of excellence (mostly

national atomic energy research organizations); and over 100 private sector companies which participated in project activities and/or invested in the new technologies developed by the project.

41. Collaboration among the project's constituents revolved around four subprojects or technology transfer programmes under the following headings: tracer technology; non-destructive testing; radiation technology; and nucleonic control systems. In addition, several technology transfer modalities were employed (e.g. national and regional training courses, national and regional executive management seminars, expert missions and fellowship training, meetings of national project coordinators, expert advisory group meetings, industrial demonstration sessions, etc.). These technology transfer mechanisms focused on industrial production processes for selected high priority subsectors such as pharmaceutical, wood and paper products, minerals, coal processing, wire and cable, or the steel industry.

42. The successful networking of RCA within the regional industrial context rested on three main factors: (a) the excellent job done by IAEA in project conception, planning and execution; (b) the strong commitment of national counterpart agencies and readiness of participating governments to collaborate actively with captains of private industry; and (c) the resourceful and technologically advanced private sector that proved able to absorb and build on the project's results.

43. These factors virtually assured the project's economic multiplier effects. With a total budget of just under US$ 15 million, the project had generated, by the time of its completion in 1991, identifiable initial investments worth over US$ 190 million of which US$ 150 million was by local private companies. Yet other substantial cost benefits were expected to accrue to the region under a secondary objective of the project, namely to reduce raw material and energy inputs into industrial processes, thereby reducing the costs of production while raising the quality and export competitiveness of the region's industrial products. Thus the project's overall strategy was targeted to achieve multiple and long-term economic advantages for the region.

44. RCA shared a number of positive characteristics with RNAM besides the fact that both projects were active under UNDP financial support between 1977 and 1991. Firstly, each had a sharply focused professional constituency, namely national atomic energy research organizations for RCA, and agricultural machinery industry sector for RNAM. Secondly, both projects were based on the network concept by which counterpart institutions in the participating countries were enabled through the projects' facilities to maximize collaboration in science and technology for the pursuit of common interests and coherent economic objectives. Thirdly, both projects placed high premium on technology adaptations and innovations dictated by the assessed needs and capabilities of targeted end-users. Furthermore, the projects were deliberately geared to support private entrepreneurship. Their strong outreach to the production system resulted in significant economic investment spin-offs.

45. Although other projects in the sample, especially INFOFISH, shared the above features, RCA and RNAM stand out in several respects as excellent case studies of how United Nations system organizations can and should support technology capacity building in the developing countries in order to accelerate their economic and industrial growth. The main lesson is that projects should not be planned and executed in an ivory tower but in full and active partnership with the main stakeholders, especially the expected users of project outputs.

C. Awareness-raising and advocacy for science and technology

46. Eight out of ten projects of the sample achieved an excellent rating under this heading, which underscores the sample's high level of success viewed from another angle. The projects' strong interactions with their environment and the private sector in particular were possible mainly because of their awareness-building and advocacy activities that reached out to a broad spectrum of government policy and decision makers, science and technology agencies and entrepreneurs in each project's constituency.

47. One project, namely Science and Technology Policy Dialogue (NAST) implemented by the Royal Nepal Academy of Science and Technology with the support of UNCSTD, was devoted almost exclusively to building awareness in government policy circles and Nepalese business community about the socio-economic and development benefits of appropriate science and technology strategies and tools.

48. Several projects had explicit or implicit awareness objectives as a necessary means to keeping targeted stakeholders informed of and involved in project activities, thereby ensuring the widest possible diffusion and application of outputs. On that depended the economic viability and development impact of project results. Examples include RCA and RNAM discussed earlier, as well as Assistance in Fish Handling and Processing (INFOFISH), Asia and Pacific Centre for Transfer of Technology (APCTT), Strengthening the Patent Administration in Malaysia (SPA, Technology Development and Training Programme for Computer-based Systems in India (INTER-ACT), and Strengthening of Perumtel Banding Training Centre (PERUMTEL).

49. Awareness-building modalities commonly used by the projects consisted of training, briefing and technology demonstration sessions; a wide range of publications (books, brochures, newsletters, articles, videotapes and project documentation), and to a limited extent computerized information systems. Television and radio networks were very rarely used. The following paragraphs discuss publications and computerized information system approaches while training is examined under section D.

50. Among the ten projects INFOFISH had probably the most extensive and active information network which was used to optimal effect in keeping the fisheries industry and government policy circles regularly informed of evolving technologies in fish handling and processing and of market trends within and

outside of Asia and the Pacific region. The project published technical manuals, market reports, fact sheets, news items, occasional papers and handouts. Its "INFOFISH International" had an estimated readership of over 2400 and reached out to countries in the Mediterranean region, Africa and Latin America and the Caribbean. The project was additionally linked to FAO information systems.

51. APCTT produced a number of publications, including four country case studies for Australia, Papua New Guinea, Singapore and Vietnam, as well as a Directory of Technology Promotion Institutions in Asia and the Pacific. The Centre has continued to publish its bi-monthly journal entitled "Asia Pacific Tech Monitor". The Centre also initiated a regional technology information network known as METI (Mechanism for Exchange of Technology Information), through which about 500 technologies have been transferred to parapublic and private entities. The Centre's visibility and awareness-building function had suffered somewhat from its original location in Bangalore. It has now moved to New Delhi from where it is expected to relate better to its constituency and United Nations system organizations.

52. The Institute for Medical Research (IMR) in Malaysia, which was supported by the WHO Programme for Training and Research in Tropical Diseases (TDR), also effectively used the publications mode (especially articles in scientific journals) to build regional and international awareness of its activities and outputs. Targeted readership consisted almost exclusively of researchers in tropical diseases. The Inspectors found during their field inspection that WHO support to the Institute had definitely enhanced its status and visibility, and measurably broadened the scope of its activities.

53. The only project with a limited awareness function was the Development of Civil Aviation Training Centre (CATC) in the Philippines, which appeared to have a number of problems, including notably the lack of firm governmental support. Although the project was financed as a regional undertaking, it was apparently not backed by an intergovernmental agreement which could have given it wider exposure and access to resources within the region.

54. Thus while UNDP/ICAO support under the project enabled the Centre to organize training courses for participants from several countries of the region, the Centre itself remained administratively and financially an arm of the Ministry of Transport of the Philippine government. The Inspectors observed during field investigations that hardly any effort had been made under the project, besides the training courses, to promote awareness of the Centre's activities within the regional civil aviation community. Moreover, although the Centre was supposed to be one of a network of four civil aviation training centres in the region, it had virtually no working contacts or information exchanges with the other centres located in Bangkok, Jakarta and Singapore.

D. Training

55. In addition to publications and dissemination of technological information, training in various forms was the other major mode used by the projects to achieve their science and technology development objectives. An estimated total of 8,000 nationals of the region were trained by the ten projects. RCA alone trained over 5,000 during its ten years of operations, using both formal and informal approaches and a wide variety of training methods, such as general demonstration sessions, specific technology workshops, seminars, fellowships and study tours. In carrying out its training function, RCA used 188 experts and 386 expert assignments.

56. For most of the projects, the level of training was at the graduate or post-graduate level; for government officials it was at the policy and decision-making level, and for the private sector at executive management level in general. For example, the more than 500 persons trained by RNAM were predominantly design and manufacturing engineers, whereas equal emphasis on the training of agricultural extension personnel as well as equipment maintenance and repair technicians would have strengthened the project's overall thrust to the local level. Similarly, the Institute for Medical Research in Malaysia emphasized the training of post-graduate researchers and not enough research and medical support personnel such as laboratory technicians. However, three projects (PERUMTEL, INTER-ACT and CATC) provided training to a judicious mix of intermediate and high-level personnel.

57. The content and quality of training were judged by the Inspectors to be quite satisfactory on the whole in regard to each project's science and technology objectives. RCA, RNAM, PERUMTEL and INTER-ACT emphasized practical, hands-on demonstrations and applications with the aid of appropriate equipment and course materials. In addition, PERUMTEL emphasized more than any other project of the sample management courses relating to the telecommunications industry. Likewise, the patent administration project in Malaysia imparted techniques in the organization and operation of a national patent system. Besides those two examples, the rest of the projects gave hardly adequate attention to the development of organization and management skills which constitute a vital element of any science and technology transfer package.

58. The Inspectors also found that training was very well targeted to local needs and was particularly responsive to the economic and industrial development imperatives of the region. For example, training by APCTT to government officials emphasized appropriate science and technology policies and strategies supportive of economic growth and the requirements of environmental protection. INFOFISH through its training programme endeavoured to assist governments and the regional fisheries industry in identifying and planning national fishery development policies that contribute to production and marketing efficiency. However, INFOFISH training efforts faltered following the termination of UNDP financial support in 1990.

59. Another commendable finding is that training was deliberately aimed at quite a broad spectrum of science and technology agents such as government and para-public officials, private sector corporations, academic and research institutions, professional associations and NGOs.

60. To support its objective of contributing towards the reorganization and strengthening of the Malaysian patent system, the SPA project provided training to officials of government and R & D institutions, patent attorneys, members of inventors' associations and corporate patent counsels. In the process the project successfully sharpened national awareness of the importance of intellectual property issues in the context of rapid economic and industrial expansion. Similarly, participants in PERUMTEL's training programme included officers from the private industry and para-public telecommunication schools located in different regions of Indonesia.

61. Training experts used by the project sample were recruited almost exclusively either from the region or from the developed countries, especially Western Europe. Some of the projects (APCTT, RCA, RNAM, INFOFISH, INTERACT) also made successful use of regional TCDC approaches. RCA for example had an explicitly stated TCDC target of 25 per cent for the delivery of project activities. The projects made virtually no use of south-south inter-regional forms of cooperation or sources of expertise. In some cases, the regular technical staff of the executing or implementing agencies participated actively in the planning and conduct of training activities (e.g. IAEA, ICAO, APCTT, WIPO, RNAM).

62. The PERUMTEL project was faced with two difficulties in respect of its training experts assigned by ITU. Firstly, the number of experts, five at the time of the Inspectors' field visit, appeared a bit too many in relation to the actual scope of training activities observed by the Inspectors. As a result the experts were visibly under-employed. Secondly, the experts experienced difficulty in communicating with their trainees having in the majority only scant knowledge of the English language used by the experts. The latter in turn had no knowledge of the Indonesian language and no advance knowledge or briefing on the project's cultural setting. This language and cultural communication problem constrained the full achievement of the project's training objective. However, this situation was unique to PERUMTEL among the ten projects in the sample.

63. With respect to the effectiveness and impact of the training function, government officials and other persons contacted during field investigations expressed to the Inspectors their general satisfaction with training results. For example, the management and staff of the Indonesian Atomic Energy Agency stated their conviction that the RCA project and IAEA support in general had considerably strengthened their self-reliance in technological expertise and had built up their self-confidence in the handling of advanced technologies. Likewise, the government of Malaysia (Ministry of Domestic Trade and Consumer Affairs) expressed complete satisfaction with the results of the patent administration project executed by WIPO. Similar appreciation was voiced by government

officials for WHO's support to the Institute for Medical Research, as well as for the achievements of INFOFISH and RNAM.

E. Sustainability and impact

64. The foregoing review leaves no doubt about the relevance, viability and impact of the sampled projects taken together. By these projects, organizations of the United Nations system made a very useful catalytic contribution to fostering endogenous self-reliance in science and technology for the development of Asia and the Pacific region.

65. Although the Inspectors could not more rigorously evaluate the overall economic and social returns of the projects, it was obvious that at least five of them did induce direct economic benefits and multiplier effects (RCA, RNAM, SPA, INFOFISH, INTER-ACT). Judged solely from a quantitative cost-benefit angle, the roughly US$ 80 million that comprised total United Nations system expenditures for the ten projects represented barely 27 per cent of the combined investment spin-offs (over US$ 300 million) from RCA and RNAM alone. That, of course, is only a small indicator - but an instructive one - of the development value of United Nations system technical cooperation with countries of the region, especially considering that the ten projects evaluated by the Inspectors represent only a minuscule fraction of the organizations' aggregate activities in Asia and the Pacific.

66. A major factor underlying the sustainability and impact of the projects was strong and consistent support by host governments, except for (CATC). On the whole, project management and operations were not constrained by lack of government counterpart contributions or by frequent changes in government and/or national implementing agencies. Other strong assets included the existence of clear and long-range national science and technology policies as well as the active supportive role played by the developed countries and newly industrializing countries of the region.

67. Besides firm governmental support and a favourable institutional and policy environment, the sustainability and development impact of project outputs also derived from the fact that project objectives and activities were in general firmly geared towards the economic and industrial users of the science and technology products offered by the projects. The active participation of production stake-holders in project operations, especially training, and their demonstrated ability to adopt and adapt new technologies, were definitely decisive in ensuring the successful transfer to the economic and industrial sectors of the technology packages of the sample.

68. Evaluation findings are similarly positive with respect to the overall financial and programme sustainability of the science and technology institutions supported or strengthened by the projects. In this regard, national institutions appeared to be on a particularly sound footing in terms of virtually guaranteed long-term governmental support or their autonomous ability to develop projects and attract external funding. Examples include the Institute for Medical Research and Patent

Administration Office, both in Malaysia, the Royal Nepal Academy for Science and Technology, National Atomic Energy Agencies or Institutes of Agricultural Machinery. Of all the national institutions visited by the Inspectors only the Civil Aviation Training Centre (CATC) in the Philippines was visibly faltering, having lost a good many of its instructors to better-paying jobs elsewhere in the region and the Middle East.

69. The situation and future of regional inter-country institutions (e.g. APCTT, RNAM, INFOFISH) were only barely satisfactory at the time of inspection. Both APCTT and RNAM had suffered disruptions as a result of change of location, APCTT moving from Bangalore to New Delhi and RNAM from Los Banos in the Philippines to Bangkok. Both institutions were also still to make a breakthrough in securing external funds to support programme activities.

70. INFOFISH had to curtail some of its core programmes, especially training, on the termination of UNDP/FAO support. Its institutional costs, which stood at 50 per cent of the budget at the time of inspection, appeared a bit too high and unsustainable. However, the Centre was self-financing close to 40 per cent of its budget, essentially from its publications revenue. In this respect INFOFISH did better than either APCTT or RNAM which distributed a good deal of their publications free of charge.

71. Regarding the sustainability of the INFOFISH project, FAO contends that this project and its sister organizations (INFOPECHE, INFOSAMAK and INFOPESCA) have now become independent and firmly established intergovernmental organizations dedicated to the promotion of TCDC, and cooperating amongst themselves, with the FAO/GLOBEFISH system playing a coordinating role. This, in the view of FAO, is the best indication of sustainability of the projects, and of INFOFISH in particular. While the Inspectors agree with FAO they nevertheless maintain that, at the time of their field inspection, the future of INFOFISH core programme activities was very much in doubt following the termination of UNDP funding.

72. The evaluation findings outlined in this chapter demonstrate that, despite its essentially catalytic nature, United Nations system technical cooperation can have a palpable developmental impact and affect the lives of ordinary people where the targeted community is actively involved and the policy and institutional environment is favourable. The Inspectors believe that these positive findings are instructive and timely in a period when the multilateral development system appears to be in the throes of doubt about its achievements and relevance.

73. Most of the projects evaluated above were funded essentially by UNDP which, as the kingpin of the United Nations development system, should take the lead in publicizing the system's development cooperation achievements world-wide. A separate and prominent chapter on such achievements in the Human Development Report should certainly promote the cause of international development cooperation and add grist to resource mobilization efforts. Other

organizations of the system should likewise publish their most significant technical cooperation achievements using internal and external media.

74. Several of the projects reviewed above (e.g. APCTT, INFOFISH, RCA, RNAM) explicitly sought to promote regional cooperation in science and technology. As already noted, the projects were quite successful in facilitating intercountry pooling and sharing of expertise in the spirit of collective self-reliance. In view of the high prominence the VPA gives to regional and inter-regional (south-south) approaches, this aspect is examined in some depth in the following chapter.

IV. REGIONAL AND INTER-REGIONAL COOPERATION

A. Measures recommended by the VPA

75. Regional cooperation and integration have become a major feature of the evolving global economic order of which Asia and the Pacific region is generally foreseen to emerge as perhaps the most important component in the next century. Thus the strengthening of south-south cooperation within the Asia and Pacific region, and between it and other developing regions, could contribute to achieving one of the central objectives of the VPA, namely to restructure the present asymmetric international scientific and technological relations.

76. The VPA gives pride of place to subregional, regional and interregional cooperation in science and technology. For example, it urges the developing countries to adopt the following measures and mechanisms for strengthening their scientific and technological capacities at subregional, regional and interregional levels:

(a) Undertake joint initiatives relating to the exploration and utilization of their natural and other resources;

(b) stimulate and establish joint industrial projects, with the objective of maximizing the results of utilization of their resources, capital and skills, including suitable management and marketing arrangements;

(c) establish subregional and regional "skilled manpower inventories";

(d) stimulate and promote the transfer of scientific knowledge and technology among countries of the subregions and regions;

(e) undertake appropriate regional development projects which require a significantly high scientific and technological input;

(f) take special measures in the context of greater horizontal linkages between developing countries, bearing in mind in particular the special needs of the least developed, land-locked, most seriously affected and island developing countries (A/CONF.81/6, paragraph 38).

77. The VPA additionally recommends a number of institutional arrangements designed to bolster south-south cooperation. For example, it calls for the creation of a network of scientific and technological institutions or agencies which would carry out, in a cooperative manner, activities related to the whole gamut of scientific and technological activities, or development of an endogenous scientific and technology base, promotion of technological innovation and research and development programmes, training, information systems, or negotiations with technology suppliers, including transnational corporations (idem, paragraph 40).

B. Intra-regional cooperation and integration

78. Asia and the Pacific region is probably the most heterogeneous in the world in terms of race, ethnicity, culture, country size and population, per capita income, or stage of development and industrialization. Some polar extremes include Australia and Nepal, China and the Maldives or Japan and Vanuatu. Further, countries and subregions display wide differences in factor endowment, stock of science and technology, investment inflows and trade patterns, or comparative advantages. Overlapping this diversity are various forms of competition among the countries: competition for economic growth, for foreign direct investment, for export markets or for the acquisition of advanced technologies, not excluding armaments - related technologies.

79. However, the above complex reality far from constitutes a barrier to regional cooperation and integration. Indeed, there are strong indications that the entire region in the future could be transformed into a vast pool of mutually reinforcing complementarities among countries and subregions as a result of the rapid and sustained expansion of intraregional foreign direct investment, industrialization patterns and trading links, particularly in the greater China triangle, East Asia generally, South East-Asia, and lately but increasingly, in the Indian subcontinent as well.

80. For example, of the US$ 34 billion in foreign direct investment estimated to have flowed to China alone in 1994, some US$ 27 billion, or 80 per cent, originated from within the region. Thus market forces and more specifically the intraregional expansion of investment flows and industrial growth have emerged as the prime-mover of regional cooperation and integration, and of the spread within the region of investment-related science and technology.

81. These trends are expected to be amplified by the ever-increasing competition for foreign direct investment and economic growth, and by the resultant general shift from import-substitution to more liberal, export-oriented macro-economic regimes. Also contributing to technological integration trends is the emerging vertical division of labour as a result of increasing specialization and restructuring of production in the industrialized and newly industrializing countries which are delocating less capital and technology - intensive industries to other countries of the region.

82. Deconcentration of industrial production is accompanied by increasing reliance of transnational corporations in particular on various forms of subcontracting and twinning arrangements with small and medium-sized enterprises and industries. These arrangements are proving to be an effective vector of technology transfer, adaptation and innovation at the micro enterprise level. Thus the more technologically advanced countries and regional affiliates of foreign transnational corporations are in effect serving as radial poles of technological diffusion and integration.

83. However, not all countries and subregions are sharing fully in this market-driven pattern of science and technology development within the region. Still left out in varying degrees are the Pacific Island countries and the Least Developed Countries (e.g. Afghanistan, Bangladesh, Fiji, Maldives, Myanmar, Nepal, Papua New Guinea, Sri Lanka, Vanuatu) and countries in transition to a market economy (Cambodia, Laos, Mongolia and Vietnam). To this latter group can be added ex-soviet Republics of Central Asia which recently became members of the United Nations Economic Commission for Asia and the Pacific (Azerbaijan, Kazakhstan, Kyrgyzstan, Taijiskistan, Turkmenistan and Uzbekistan).

84. For the Pacific Islands and LDCs of the region, multilateral and bilateral development cooperation programmes and projects still constitute the most important vehicle for the transfer and development of science and technology. It is this group of countries, together with the above-mentioned newly independent Republics of Central Asia, that stand to benefit more from intensified United Nations system support to intra-regional cooperation in science and technology (see further below). These groups of countries may therefore be eligible for specially-tailored programmes for the development of their science and technology capacities.

85. Regional cooperation already exists, besides market forces, in the form of intergovernmental groupings, such as the Association of South-East Asian Nations (ASEAN); South-Asian Association for Regional Cooperation (SAARC); South Pacific Forum (SPF); Economic Cooperation Organization (ECO); Asia-Pacific Economic Community (APEC); East Asia Economic Caucus (EAEC); or the Pacific Economic Cooperation Council (PECC).

86. Excepting ASEAN which dates back to 1967, most of these groupings are relatively new and essentially subregional in scope, besides APEC which is interregional, comprising selected countries in Asia and the Americas. Three of the groupings (APEC, ASEAN and SAARC) have the explicit goal of reinforcing cooperation in the area of science and technology.

87. The ASEAN experience demonstrates the practical feasibility of VPA recommendations relating to subregional, regional and interregional cooperation in science and technology. ASEAN, which comprises Indonesia, Malaysia, the Philippines, Singapore and Thailand, functions through an extensive collaborative network operating from the summit to the lowest level and in virtually all major economic sectors. It has several committees, one of which is the Committee on Science and Technology (COST). A major characteristic of ASEAN is the strong involvement of the private sector in policy formulation and project implementation, particularly with respect to the ASEAN Industrial Complementation (AIC) programme which is geared towards rationalization and complementarity of industrial policies and structures among the five member countries.

88. The generation of an AIC project involves an elaborate process of interaction at different levels between government officials and private-sector companies represented by the ASEAN Chambers of Commerce and Industry (ASEAN-CCI).

The latter have responsibility for identifying and negotiating AIC projects which are approved, together with related trade preferences, by ASEAN governmental organizations.

89. This process of interaction stimulates the exchange of information and technological cooperation among governmental and private sector agencies, especially at the level of industry and professional associations. A main feature of such interaction is the organization of ASEAN-sponsored conferences, symposia, seminars and workshops on specific science and technology topics which, because of their regional specificity, have the potential of contributing to the development of regionally appropriate technologies.

90. The ASEAN collaborative framework for science and technology, which over the years has attracted substantial financial and technical support from the donor community and the United Nations system (e.g. UNDP, UNIDO, ESCAP), especially in the context of its AIC programme, is certainly a good example of how an inter-country mechanism can be used to foster collective self-reliance, and to generate financial resources and investments for the acquisition, adaptation and upgrading of science and technology for the benefit of the participating countries.

91. Overall, therefore, and notwithstanding subregional and country disparities, Asia and the Pacific region can be considered to have made significant advances in the development, utilization and diffusion of science and technology to accelerate economic and industrial growth. But some challenges are still to be overcome, such as blending labour-intensive and technology-intensive modes of production, or harnessing technological advances to the requirements of sustainable human development, such as poverty alleviation, expansion of job opportunities, or environmental protection.

92. A dogged drive towards intra-regional cooperation that builds on complementarities and relative comparative advantages, whether through integrative market forces or formal intergovernmental institutions and groupings, should certainly enable developing countries of the region, especially the LDCs, to share in the socio-economic benefits of scientific and technological progress. This is also the view of the ESCAP secretariat which, in commenting on the draft of this report, observes that the design and application of innovative ECDC/TCDC programmes to encourage technology flows to LDCs and other disadvantaged countries is necessary and overdue, and until recently has been "a neglected area". It sees the need to improve the technology climate in many LDCs, island developing countries and economies in transition, so as to encourage technology inflows and to obtain assistance from more successful countries in the region.

93. For its part, UNESCO (New Delhi Office) sees an opportunity for enhanced cooperation with APCTT (now also located in New Delhi) in supporting LDCs in the Indian subcontinent and other parts of Asia and the Pacific, especially in job creation and valorization of natural resources, including particularly aromatic and medicinal plants. UNESCO proposes the strengthening of joint programmes between its New Delhi Office and APCTT within the parameters of endogenous

technologies and the development of national policies for the management of frontier technologies in the LDCs of the region.

94. Developing countries in other regions might wish to avail themselves of the science and technology development experience of Asia and the Pacific region by using it as a beachhead for expanding south-south inter-regional collaboration. In this regard, organizations of the United Nations system would seem to have a fundamental role to play, such as promoting and facilitating the sharing of experiences among developing countries, or using successful regional groupings like ASEAN to amplify south-south linkages as further discussed in the following paragraphs.

C. South-South cooperation: towards an expanded role by the United Nations System

95. Among the many recommendations contained in the VPA regarding the role of the United Nations system in fostering cooperation among developing countries in the field of science and technology, the following are worth citing:

96. "International organizations should act as a tool for systematic exchange of information on experiences of different countries in all fields pertaining to the application of science and technology for development. In this connection, continuing consideration should be given to the establishment of a global information network, within the United Nations system, where emphasis will be placed on priority needs of the developing countries" (VPA, ibid., paragraph 64).

97. "Exchange of experience and cooperative projects between and among developing countries should be encouraged to build up collective self-reliance. Regional centres are valuable instruments for pooling resources, talents and facilities and for working out problems of mutual interest through a network of collaborating institutions from all participating countries" (VPA, ibid., paragraph 79(h)).

98. It has already been noted in the preceding chapter how United Nations system organizations have successfully used the project vehicle and network concept to promote and facilitate inter-country collaboration in science and technology (e.g. IAEA for RCA; ESCAP for APCTT and RNAM; and FAO for INFOFISH). Each of these projects was suitable, with minimal additional funds, for an inter-regional outreach involving two or more developing regions. But hardly any thought appeared to have been given to that possibility either at the planning or implementation stage of the projects.

99. In its comments on the draft of this report, IAEA points out that the need for inter-regional linkages was identified in the formulation of the Agency's 1995-1996 technical cooperation programme, approved by its Board of Governors in December 1994. This included an inter-regional TCDC project aiming to facilitate the exchange of experiences between the Agency's three Regional Cooperative Agreements in Africa (AFRA), Latin America (ARCAL) and Asia and the Pacific

(RCA). These Agreements are the Agency's main tool for carrying out technical cooperation projects with the aim of establishing self-sufficiency in the use of nuclear technologies in fields such as industry, health, hydrology and agriculture in each region where the Agreements are being implemented.

100. ESCAP has been quite successful in promoting south-south collaboration among its Member States in accordance with its regional mandate. Besides APCTT and RNAM, whose potential could be tapped more extensively within and outside the region, ESCAP has sponsored to date close to 40 regional cooperative mechanisms ranging from major initiatives like the Seoul Plan of Action for Promoting Industrial Restructuring in Asia and the Pacific to formal institutions, networks and working groups in various sectors.

101. Some ESCAP-sponsored networks (e.g. Regional Trade Information Network (TISNET), or Regional Investment Information and Promotion Service (RIIPS) could form the basis for a south-south inter-regional trade and investment information system supported as a joint project by the regional commissions and other appropriate United Nations system organizations, especially UNCTAD, UNIDO and WIPO.

102. Furthermore, ESCAP has a separate programme for promoting Technical and Economic Cooperation among Developing Countries (TCDC/ECDC) which has so far successfully attracted funding from some donors (Australia, Germany, Japan, The Netherlands and Norway) for promotional activities. In addition, some of its members (China, India, Indonesia, Malaysia, the Philippines, the Republic of Korea, and Thailand) have established TCDC/ECDC policies and mechanisms for south-south cooperation at subregional, regional and inter-regional levels, with expanding private-sector participation.

103. The regional commissions, in collaboration with the UNDP Special Unit for TCDC, could more systematically use similar facilities in their respective regions to expand inter-regional TCDC/ECDC schemes, especially in science and technology. Such schemes should increasingly be broadened to include private-sector users of science and technology, such as chambers of commerce and industry, research and development as well as training institutions, professional associations and non-governmental organizations.

104. UNIDO is another organization with an institutionalized TCDC/ECDC programme. Although it has for this purpose a distinct organizational unit with six professional staff, UNIDO TCDC/ECDC activities in fact pervade all its substantive programmes, a feature somewhat unique among the specialized agencies. Programme activities are carried out mainly through the organization of various types of meetings, e.g. solidarity ministerial meetings for investment promotion purposes and focused primarily on LDCs, sector-specific meetings, system of consultations, and technical meetings organized by the substantive programmes. These initiatives include discussion of issues relating to technology acquisition and know-how.

105. A 1992 internal evaluation of the UNIDO TCDC/ECDC programme essentially concluded that "activities remain inadequate in relation to the enormous potential for such cooperation, despite the recognized fact that developing countries have built up a big potential for sharing expertise in a wide range of fields" (ODG.14 (SPEC) of 25 May 1992).

106. The internal evaluation also highlighted the advantages of the programme, such as those resulting from commonalities in development interests and similarities of problems encountered, appropriateness of training, skills, expertise, etc., and which give TCDC/ECDC arrangements a competitive advantage whenever adaptation to a particular environment is required. The evaluation also recommended adjustments to the programme in order to make it more responsive to the needs of private-sector investors.

107. The UNIDO direct support for south-south cooperation in Asia and the Pacific has, among other initiatives, centred on biotechnology, as examplified by its assistance in the creation of the International Centre for Genetic Engineering and Biotechnology (ICGEB). Thanks to the facilities of this Centre, UNIDO has provided training to over 100 senior scientists and researchers in advanced sciences and new technologies, especially biotechnology. Furthermore, UNIDO has established a regional node for the Biosafety Information Network and Advisory Service (BINAS) in Bangkok, in cooperation with UNDP and FAO. The Inspectors believe that these initiatives should be given an inter-regional dimension.

108. The ILO Information Service on Technological Alternatives for Development (INSTEAD), established in 1988 and inter-regional in scope, is an interesting example of action taken by an international organization in line with the VPA recommendations on the exchange of information on science and technology for development. In the view of ILO, lack of knowledge and understanding of available technologies is often responsible for wrong choices. The ILO INSTEAD services are not restricted to the Organization's direct constituency; they are accessible to all those concerned with the promotion, evaluation, development, dissemination, testing and adaptation of different technologies. Users range from entrepreneurs, agriculturalists, technology institutions, universities, other United Nations agencies, government agencies, non-governmental organizations, etc. Sectors covered include agricultural tools, building materials, energy, food processing, handicrafts and related industries.

109. FAO has since the sixties promoted over 100 south-south cooperative networks within the fields of its competence, 20 of which are operational in the Asia and Pacific region. Particular mention may be made of the Asia-Pacific Association of Agricultural Research Institutions (APAARI), which links the agricultural research organizations of 13 countries of the region. APAARI's work in documenting and disseminating "success stories" has been of a pioneering nature.

110. More generally, TCDC together with ECDC continues to be a priority means of action in the FAO programme of activities funded from the Regular Budget, as

well as extra-budgetary resources. FAO Governing Bodies have consistently supported TCDC and called for accelerated efforts in this regard.

111. The FAO support to TCDC has concentrated on key areas in practically all fields of its competence - crop production and protection, land and water development, dairy and milk production, food security, fisheries, forestry, nutrition and rural development. FAO has been using several means to achieve this: inter-country consultations, training, workshops, seminars and study-tours designed to promote exchange of experience and technical knowledge, expansion of information systems to disseminate TCDC data and support to regional organizations and institutional networking.

112. Most recently, the Director-General of FAO launched a major initiative in proposing an agreement concerning the use of experts within the framework of TCDC to all developing member countries. The Agreement provides a structured framework in facilitating the use of such experts and in clearly spelling out the respective obligations of the Releasing Government, the Beneficiary Government and FAO. By now, some 56 countries have signed the Agreement, including the following from the Asia and Pacific Region: Bangladesh, China, Fiji, India, Indonesia, Democratic Peoples Republic of Korea, the Maldives, Nepal, Pakistan, the Philippines, Sri Lanka and Western Samoa.

113. The next critically important step for FAO in its commendable south-south cooperation endeavours is to further enhance them with an inter-regional perspective.

114. Science and Technology is part of the UNESCO constitutional mandate and has been perhaps the most important component of its technical cooperation activities in Asia and the Pacific region, where it has field offices in Beijing, Jakarta and New Delhi. Over the years UNESCO has supported numerous projects within the region, at country, subregional and regional level, concerned wholly or partly with science and technology policies, education, training and research institutions. However, the Inspectors could not ascertain the inter-regional scope activities of the UNESCO in Asia and the Pacific.

115. IMO reports that its Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas, in cooperation with UNDP and the Global Environment Facility, can offer specific strategies for enhanced inter-regional cooperation, for example in the development of models on marine pollution reduction/prevention and risk management, and their application as demonstration projects at specific sites. All demonstration projects designed so far shall be replicated in other coastal areas and subregional seas in East Asia and elsewhere. In addition to the experiences gained at demonstration sites developed within the Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas, the results of a Global Waste Survey that is being carried out by IMO, assist in establishing technical cooperation and development programmes in other regions. The Global Waste Survey, which was initiated by the Consultative Meeting of Contracting Parties to the London Convention in 1972, identifies in the

various regions the need for application of environmentally safe waste management technologies and regulations. In cooperation with industrial organizations and the assistance of Contracting Parties to the London Convention 1972, the results are being used in establishing demonstration sites, building upon the East Asian Seas Programme. Such a programme has been developed for the treatment and disposal of wastes from land-based activities as well as wastes derived in relation to marine transportation, for ports in East Africa.

116. With regard to the development of sustainable financing mechanisms, it has been recognized within the programme executed by IMO that concerted efforts are required of all sectors active in coastal and marine areas, e.g. communities, governmental agencies, non-governmental organizations and industry. It is in particular the private sector that has to play an important role and has accordingly been firmly incorporated in this section. The cooperating agencies anticipate that sustainable financing mechanisms will ensure sustained and long-term activities beyond the life of the programme. This includes identification of potential sources of financing, both traditional and innovative (such as trust funds, environmental swaps, green taxes, user fees, revolving funds and pollution prevention incentives). A regional conference on the issue of sustainable financing is planned in Manila, Philippines, on 26 and 27 September 1995 to initiate discussion on the various suggestions and to build up support at the regional level.

117. The above examples sketch out some initiatives that seek to promote south-south collaboration in science and technology, often with funding from the developed countries and in the spirit of global inter-dependence. The Inspectors conclude that organizations of the United Nations system should make more systematic use of the science and technology experience, institutions and projects developed in Asia and the Pacific region as opportunities or entry-points for expanding south-south cooperation involving two or more regions, and that their science and technology information systems should be periodically evaluated for their relevance and accessibility to potential users in the developing regions.

Notes

1. International Development Strategy for the Fourth United Nations Development Decade, annex to General Assembly resolution 45/199, paragraph 56.

2. Assessment of the impact of the activities of the United Nations system in promoting endogenous capacity building in developing countries in the field of science and technology. (A/CN.11/1991/4), paragraph 25.

3. These consist of (a) science and technology policies and plans for development; (b) scientific and technological infrastructure; (c) choice, acquisition and transfer of technology; (d) human resources; (e) financing; (f) information systems; (g) research and development linked to production systems; (h) cooperation among the developing countries and with the developed countries.